SLOVENSKI STANDARD
SIST EN 61620:1999

01-december-1999

Insulating liquids - Determination of the dielectric dissipation factor by measurement of the conductance and capacitance (IEC 61620:1998)

Insulating liquids - Determination of the dielectric dissipation factor by measurement of the conductance and capacitance - Test method

Isolierflüssigkeiten - Bestimmung des Permittivitäts-Verlustfaktors durch Messung der Konduktanz und Kapazität - Prüfverfahren

Isolants liquides - Détermination du facteur de dissipation diélectrique par la mesure de la conductance et de la capacité - Méthode d'essai

Ta slovenski standard je istoveten z: **EN 61620:1999**

ICS:

29.040.01 Izolacijski fluidi na splošno Insulating fluids in general

SIST EN 61620:1999 **en**

EUROPEAN STANDARD

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EN 61620

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Descriptors: Electrical insulating materials, liquid electrical insulating materials, tests, electric measurements, dissipation factor, capacitance, procedure, test equipment, labelling

English version

Insulating liquids
Determination of the dielectric dissipation factor by measurement of the conductance and capacitance
Test method
(IEC 61620:1998)

Isolants liquides
Détermination du facteur de dissipation diélectrique par la mesure de la conductance et de la capacité
Méthode d'essai
(CEI 61620:1998)

Isolierflüssigkeiten
Bestimmung des Permittivitäts-Verlustfaktors durch Messung der Konduktanz (Leitfähigkeit) und Kapazität
Prüfverfahren
(IEC 61620:1998)

This European Standard was approved by CENELEC on 1999-01-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

The text of document 10/446+446A/FDIS, future edition 1 of IEC 61620, prepared by IEC TC 10, Fluids for electrotechnical applications, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61620 on 1999-01-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1999-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2001-10-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A, B and ZA are normative and annexes C and D are informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61620:1998 was approved by CENELEC as a European Standard without any modification.

In the official version, for annex D, Bibliography, the following notes have to be added for the standards indicated:

IEC 60836	NOTE: Harmonized as HD 565 S1:1993 (not modified).
IEC 60867	NOTE: Harmonized as EN 60867:1994 (not modified).
IEC 60963	NOTE: Harmonized as HD 582 S1:1991 (not modified).
IEC 61099	NOTE: Harmonized as EN 61099:1992 (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60247	1978	Measurement of relative permittivity, dielectric dissipation factor and d.c. resistivity of insulating liquids	-	-
IEC 60475	1974	Method of sampling liquid dielectrics	-	-
ISO 5725-1	1994	Accuracy (trueness and precision) of measurement methods and results Part 1: General principles and definitions	-	-
ISO 5725-2	1994	Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method	-	-
ISO 5725-3	1994	Part 3: Intermediate measures of the precision of a standard measurement method	-	-
ISO 5725-4	1994	Part 4: Basic methods for the determination of the trueness of a standard measurement method	-	-

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Isolants liquides –
Détermination du facteur de dissipation diélectrique par la mesure de la conductance et de la capacité –
Méthode d'essai

Insulating liquids –
Determination of the dielectric dissipation factor by measurement of the conductance and capacitance –
Test method

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INSULATING LIQUIDS – DETERMINATION OF THE DIELECTRIC DISSIPATION FACTOR BY MEASUREMENT OF THE CONDUCTANCE AND CAPACITANCE – TEST METHOD

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.

3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

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5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61620 has been prepared by IEC technical committee 10: Fluids for electrotechnical applications

The text of this standard is based on the following documents:

FDIS	Report on voting
10/446+446A/FDIS	10/458/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

Annexes A and B form an integral part of this standard.

Annexes C and D are for information only.

INTRODUCTION

The conductivity σ is a characteristic of a liquid only if it is measured at thermodynamic equilibrium.

To fulfil this requirement high electric stress and/or prolonged voltage application is to be avoided, this is not the case in IEC 60247 for the d.c. resistivity measurement (electric stress up to 250 Vmm^{-1}, conventional arbitrary time of electrification 1 min).

There is a simple relationship between the dielectric dissipation factor tan δ, the conductivity σ and the permittivity ε of the liquid with no (or negligible) dipolar losses, which is the case of most liquids for electrotechnical applications:

$$\tan \delta = \frac{\sigma}{\varepsilon\omega}$$

where $\omega = 2\pi f$ and f is the frequency of the voltage.

Therefore, the measurement of either tan δ or σ gives the same information on the conduction properties of the liquid. In fact, very often in practice, there are large discrepancies between the resistivity calculated from the measurement of tan δ with conventional apparatus and the d.c. resistivity measured following the recommendation of IEC 60247.

New devices for the measurement of the conductivity σ at thermodynamic equilibrium are currently available. They are able to measure easily and with precision very low values of σ. The capabilities of this new equipment allow measurements of σ of unused insulating liquids even at room temperature.

INSULATING LIQUIDS – DETERMINATION OF THE DIELECTRIC DISSIPATION FACTOR BY MEASUREMENT OF THE CONDUCTANCE AND CAPACITANCE – TEST METHOD

1 Scope

This International Standard describes a method for the simultaneous measurement of conductance *G* and capacitance *C* enabling the calculation of the dielectric dissipation factor tan δ of insulating liquids. The proposed method applies both to unused insulating liquids and insulating liquids in service in transformers and in other electrical equipment.

The standard is no substitute for IEC 60247; rather it complements it insofar as it is particularly suited to highly insulating liquids and it recommends a method of measurement for these liquids. This method allows values of the dielectric dissipation factor as low as 10^{-6} at power frequency to be determined with certainty. Moreover, the range of measurements of tan δ lies between 10^{-6} and 1 and can be extended up to 200 in particular conditions.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60247:1978, *Measurement of relative permittivity, dielectric dissipation factor and d.c. resistivity of insulating liquids*

IEC 60475:1974, *Method of sampling liquid dielectrics*

ISO 5725-1:1994, *Accuracy (trueness and precision) of measurement methods and results – Part 1: General principles and definitions*

ISO 5725-2:1994, *Accuracy (trueness and precision) of measurement methods and results – Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

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